AFCTN Test Report 94-055

AFCTB-ID 93-107

Technical Illustration Transfer

Using:

Auto-trol Technology's Data

MIL-D-28000A (IGES)

Quick Short Test Report

03 December 1993

Prepared for
Electronic Systems Center
Det 2 HQ ESC/AV-2
4027 Colonel Glenn Hwy, Suite 300
Dayton, Ohio 45431-1672

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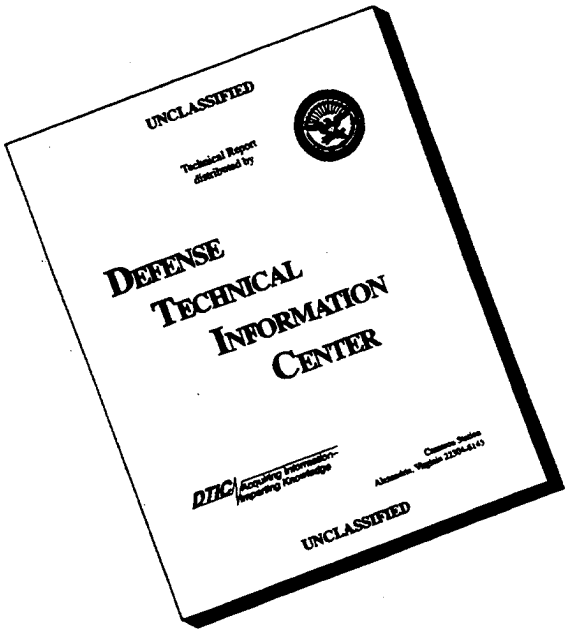

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Prepared By
Air Force CALS Test Bed
Wright-Patterson AFB, OH 45433

AFCTB Contact
Gary Lammers
(513) 427-2295

AFCTN Contact
Mel Lammers
(513) 427-2295

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Contents

1. Introduction

1.1 Background

The Department of Defense (DoD) Air Force Continuous Acquisition and Life-cycle Support (CALS) Test Network (AFCTN) is conducting tests of the military standard for the Automated Interchange of Technical Information, MIL-STD-1840A, and its companion suite of military specifications. The AFCTN is a DoD sponsored confederation of voluntary participants from industry and government managed by the Electronic Systems Center (ESC).

The primary objective of the AFCTN is to evaluate the effectiveness of the CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards. Two general categories of tests are performed to evaluate the standards; formal and informal.

Formal tests are large and comprehensive, which follow a written test plan, require specific authorization from the DoD, and may take months to prepare, execute, and report.

Informal tests are quick and short, used by the AFCTN technical staff, to broaden the testing base. They include representative samples of the many systems and applications used by AFCTN participants. They also allow the AFCTN staff to gain feedback from many industry and government interpretations of the standards, to increase the base of participation in the CALS initiative, and respond to the many requests for help that come from participants. Participants take part voluntarily, benefit by receiving an evaluation of their latest implementation (interpretation) of the standards, interact with the AFCTN technical staff, gain experience using the standards, and develop increased confidence in them. The results of informal tests are reported in Quick Short Test Reports (QSTRs) that briefly summarize the standard(s) tested, the hardware and software used, the nature of the test, and the results.

1.2 Purpose

The purpose of the informal test, reported in this QSTR, was to analyze Auto-trol Technology's interpretation and use of the CALS standards in transferring technical illustration data. Auto-trol used its CALS Technical Data Interchange System, which consists of Sun Sparcstation/SunOS hardware and Auto-trol Series 5000 v9.1 software, to produce data in accordance with the standards, and delivered it to the AFCTN technical staff using an internet electronic transfer. The stated goal was to evaluate the data and not the MIL-STD-1840A format. No Document Declaration file was delivered with this first test.

2. Test Parameters

Test Plan: AFCTB 93-107

Date of Evaluation: 03 December 1993

Evaluator:
George Elwood
Air Force CALS Test Bed
DET 2 HQ ESC/AV-2P
4027 Colonel Glenn Hwy
Suite 300
Dayton OH 45431-1672

Data Originator:
Rob Larsen
Auto-trol Technology
12500 North Washington Street
Denver CO 80241
(313) 252-2248

Data Description: Technical Illustration Test
1 Initial Graphics Exchange Specification (IGES) file

Data Source System:

IGES

HARDWARE
SUN Sparsstation/SunOS

SOFTWARE
Auto-trol *S5000 v9.1*

Evaluation Tools Used:

MIL-D-28000 (IGES)

Sun SparcStation 2
AUTODESK *AutoCAD R12*
Carberry *CADLeaf Plus v3.1*
IGES Data Analysis (IDA) *Parser/Verifier v92*
IDA *IGESView v3.05*
International TechneGroup Incorporated (ITI) *IGES/Works v1.3*

SGI Indigo2

	AUTODESK *AutoCAD R12*
	Cadkey *Cadkey v6.0*
PC 486/50	
	AUTODESK *AutoCAD 386 R12*
	AUTODESK *AutoCAD 386 R11*
	Cadkey *Cadkey v6.0*
	IDA *IGESView Windows*

Standards Tested: MIL-D-28000A

3. 1840A Analysis

3.1 External Packaging

The file was submitted to the Air Force CALS Test Bed (AFCTB) via an internet electronic transfer. Packaging was not evaluated.

3.2 Transmission Envelope

Per agreement between Auto-trol and the AFCTB, the file was submitted via an electronic transfer instead of a full CALS submission. Hence, the file was not named in accordance with the MIL-STD-1840A requirements.

3.2.1 Tape Formats

Not evaluated.

3.2.2 Declaration and Header Fields

Becuase the file was submitted via an electronic transfer, instead of as a full CALS submission, declaration and header fields were not addressed or evaluated as part of this test.

4. IGES Analysis

The transfer contained one IGES file. This file was evaluated using IDA's *parser/verifier* set for CALS Class I. This utility reported that the file meets the specification defined in CALS MIL-D-28000A.

The file was inspected for the CALS conformance statement. The correct statement was found.

The AFCTB has several tools for viewing IGES files. These tools are not used to generate a pass/fail but to report how commercially available software can handle the files. Many

of these products are used in the development of technical publications and are good indicators of usability. The use of these products is not an endorsement nor an indication of CALS capability. All operations were performed using the default settings.

The file was converted using a utility available within the AFCTB, with no reported errors. The resulting file was read into Island Graphics' *IslandDraw*, displayed and printed without a reported error. The hard copy image was the same as the original provided by Auto-trol, with the exception of horizontal line in the fractions. All of these horizontal lines were shown as vertical lines located to the left of the correct location.

The file was read using AUTODESK's *AutoCAD R12* with translator version 5.1. Compared with the provided original, the hard copy output had no discrepancies.

The file was converted using another software available within the AFCTB, without a reported error. The resulting file read into yet another software without a reported error. When the hard copy was checked, discrepancies were noted in the "General Note" where the vertical letters touched and were not slanted. The word does have a slant value. In the imbedded font block change the "delta" was not displayed. The horizontal lines in the fraction block were not displayed.

The file was converted using Cadkey's *ig2c* utility. The resulting file was read into Cadkey's *Cadkey*, displayed and printed. Variations were noted in the imbedded font block which did not display any characters except the text.

The file was read into Carberry's *CADLeaf* software without a reported error. Variations were noted in the "General Note" where the vertical text was not slanted, and the word does have a slant value. In the imbedded font block, text was shown throughout, without the special characters.

The file was read using IDA's *IGESView* and *IGESView for Windows*. No discrepancies were noted.

The file was read using ITI's *IGESWorks* without a reported error. The file was displayed and printed. No discrepancies were noted.

The IGES file was converted using a utility available within the AFCTB, without a reported error. The resulting file was read into a software, displayed and printed. The only noted discrepancy was in the "General Note" block where the letter "I" in the vertical text was slanted at a different angle. The word "SIMPLE" is one word and has a slant value.

The IGES file submitted by Auto-trol meets the specification defined in CALS MIL-D-28000A.

5. SGML Analysis

No Standard Generalized Markup Language (SGML) files were included in this test.

6. Raster Analysis

No Raster files were included in this test.

7. CGM Analysis

No Computer Graphics Metafile (CGM) files were included in this test.

8. Conclusions and Recommendations

The stated goal of this evaluation was the IGES file. The submitted file did not have a Document Declaration file nor CALS header on the data file. The file set was not a complete CALS submission.

The IGES file meets the CALS MIL-D-28000A specification.

9. Appendix A - Detailed IGES Analysis

9.1 File IENTITY2

9.1.1 IDA Parser/Verifier Log

```
**********************************
*****  IGES PARSER/VERIFIER   *****
*****       MARCH 1993        *****
*****   IGES Data Analysis    *****
*****     (708) 344-1815      *****
**********************************

Input file is ientity3.igs

Checking conformance to CALS Class I (MIL-D-28000A 2/10/92)

Today is December 3, 1993  12:31 AM

**********************************
*****    CHECK FILE SYNTAX    *****
**********************************

   Section        Records

   Start              7
   Global             3
   Directory        500  (    250 Entities)
   Parameter        487
   Terminate          1

   No syntax errors detected.

**********************************
*****  SUMMARY AND STATISTICS  ****
**********************************

*** File and Product Name Information ***

   File name from sender    = 'ientity'
   File creation Date.Time  = '931203.090822'
   Model change Date.Time   = ''
   Author                   = ''
   Department               = 'AUTO-TROL TECHNOLOGY'
   Product name from sender = 'S5000'
```

```
   Destination product name = ''

*** Parameter Delimiters ***

   Delimiter  = ','
   Terminator = ';'

*** Originating System Data ***

   System ID              = 'AUTO-TROL S5000 V 9.1'
   Preprocessor version   = 'VERSION 8.0'
   Specification version = 6 (IGES 4.0)

*** Precision levels ***
   Integer bits =    32
   Floating point  -  Exponent =    23  Mantissa =     8
   Double precision - Exponent =    52  Mantissa =    11

*** Global Model Data ***

   Model scale            =  1.0000E+00
   Unit flag              =  1
   Units                  =  'INCH'
   Line weights           =  27
   Maximum line thickness =  1.000000E+00
   Minimum line thickness =  3.703704E-02
   Granularity            =  1.000000E-06
   Maximum coordinate     =  1.650000E+01

   Drafting standard applicable to original data is not specified.

*** Status Flag Summary ***

 Blank status: Visible                    250
               Blanked                      0

 Independence: Independent                248
               Physically Subordinate       1
               Logically Subordinate        1
               Totally Subordinate          0

 Entity use:   Geometry                   152
               Annotation                  97
               Definition                   1
               Other                        0
               Logical/Positional           0
               2D parametric                0
               Construction geometry        0
```

	Not Specified	0
Hierarchy:	Structure DE applies	0
	Subordinate DE applies	250
	Hierarchy property applies	0
	Not Specified	0

*** Entity Occurrence Counts ***

Entity	Form	Level	Count	Type
106	11	0	67	Copious data - Piecewise planar, linear string(2D linear path)
110	0	0	85	Line
212	0	0	83	General note
212	2	0	1	General note - imbedded font change dimension
212	3	0	1	General note - superscripted dimension
212	4	0	1	General note - subscripted dimension
212	5	0	1	General note - super-/sub-scripted dimension
212	7	0	1	General note - multiple stack/center justified
212	100	0	6	General note - simple fractional dimension
212	102	0	1	General note - imbedded font change/double fractional dimension
404	0	0	1	Drawing
406	16	0	1	Property - Drawing size
410	0	0	1	View - Orthographic parallel

*** Entity Count by Level ***

Level	Count
0	250

*** Labeling Information ***

100% of the entities are labeled.

Unlabeled	0

Label	Count	Label	Count	Label	Count
VIEW	1	PROPERTY	1	DRAWING	1
LINE	85	LNR PATH	67	NOTE	95

*** Line Fonts Used in Data ***

```
 100   102   104   106   108   110   112   114

  -     -     -     -     -     -     -     -    Undefined
  -     -     -    67     -    85     -     -    Solid
  -     -     -     -     -     -     -     -    Dashed

                  <<<<< PART OF LOG FILE REMOVED HERE >>>>>

 *** Line Widths Used in Data ***

     Weight       Count      Width

  Defaulted       250       (0.0370)

 *** Colors Used in Data ***

  Defaulted       250

 ************************************
 *****     ENTITY ANALYSIS      *****
 ************************************

 *** Entity type: 106

 *** Entity type: 110

  --     85 lines averaging 2.424544E+00 units --

 *** Entity type: 212

       132 text strings in data file.
       Average text aspect ratio in file is 7.3620707.
       Minimum text aspect ratio in file is 0.9373333.
       Maximum text aspect ratio in file is 160.0000000.

       FONTS USED IN FILE

       FONT    COUNT    NAME

          1      130    Default ASCII Style
       1002        2    Symbol Font 2

  *** Entity type: 404

Drawing at D       5 contains 1 views.
Drawing at D       5 contains 0 annotation entities.
```

```
 *** Entity type: 406

 *** Entity type: 410

  Scale of view at D      1 is 1.000000E+00.
Orthographic View entity at D      1 has  0 clipping planes specified.
   XMIN = Not Set       XMAX = Not Set
   YMIN = Not Set       YMAX = Not Set
   ZMIN = Not Set       ZMAX = Not Set


 *** Message Summary ***

 *** Error Summary ***

     0 fatal errors 0 severe errors 0 errors 0 warnings 0 cautions 0 nitpicks
     0 notes

 *** End of Analysis of ientity3.igs ***
```

9.1.2 AutoCAD R12 Parser Log

```
Title: IGESIN Journal (v5.1 Nov 05 1992)
================================================================================

File: C:/TMP/IENTITY3.xli
Date: Thu, Dec 02, 1993
Time: 17:31:04
================================================================================

EVALUATION VERSION -- NOT FOR RESALE

Translator S/N:   117-10075750
Translating from IGES file:        C:/TMP/IENTITY3.IGS
            to AutoCAD Drawing:    C:\TMP\IENTITY3.dwg

================================================================================

Options obtained from:  C:\ACAD\SUPPORT\CALS1.OPT

Options Description: Configuration file for CALS Class I

Curves Approximated to Tolerance of           0.01

Surfaces Approximated to Tolerance of         0.01

Text Font/Style mapping:
IGES Text font      Style Name       ACAD Font
         0                SYMBOL0         iges0
         1               STANDARD           txt
         2                  LEROY           txt
         3                 FUTURA           txt
         6                 COMP80           txt
        12                GOTHICE       gothice
        13                GOTHICI       gothici
        14                 ROMANS        romans
        17                 ROMANT        romant
        18                 ROMAND        romand
        19                    OCR           txt
      1001                SYMBOL1      iges1001
      1002                SYMBOL2      iges1002
      1003                SYMBOL3      iges1003
      2001                  KANJI       bigfont

IGES Linefont/AutoCAD Linetype mapping
IGES Line Font      AutoCAD linetype        Shape file
         0                  BYLAYER
```

```
        1                CONTINUOUS
        2                    DASHED              acad.lin
        3                   PHANTOM              acad.lin
        4                    CENTER              acad.lin
        5                       DOT              acad.lin
================================================================================

Parse phase

*** Warning (IAFP__LARGER_SGL_SIG) ***
TMP/IENTITY3.IGS, line 11: IGES file has greater number of significant digits
in single precision numbers than this system.

================================================================================
Start Section:

CONFORMANCE:  This IGES file conforms to the MIL-D-28000A, 10 Feb 1992
              Class I subset (Technical Illustrations).

ILLUSTRATION IDENTIFIER:
A

Global Section:

Parameter Delimiter:      ,
Record Delimiter:         ;
Sending Product ID:       S5000
File Name:                ientity
System ID:                AUTO-TROL S5000 V 9.1
Preprocessor Version:     VERSION 8.0
Size of Integer:          32
Sgl. Precision Mag:       23
Sgl. Precision Sig:       8
Dbl. Precision Mag:       52
Dbl. Precision Sig:       11
Receiving Product ID:
Model Space Scale:        1.000000
Unit Flag:                1
Unit String:              INCH
# of Line Weights:        27
Maximum Line Width:       1.000000
Creation Date:            12/02/93 08:19:56
Minimum Resolution:       0.000001
Maximum Coordinate:       16.500000
Author:
Organization:             AUTO-TROL TECHNOLOGY
IGES Version Number:      6
Drafting Standard:        0
```

Entity Summary:

Type Count	Form	Description
106 67	11	Planar Piecewise Linear Curve
110 85	0	Line
212 83	0	General Note (Simple)
212 1	2	General Note (Font change)
212 1	3	General Note (Superscript)
212 1	4	General Note (Subscript)
212 1	5	General Note (Super/subscript)
212 1	7	General Note (Center justified)
212 6	100	General Note (Simple fraction)
212 1	102	General Note (Fnt chg/dbl fract.)
404 1	0	Drawing (form 0)
406 1	16	Property (Drawing Size)
410 1	0	View
Total 250		

Translation phase

Drawing Entity (404 Form 0) at DE 5, with
   name = ,
   size = 16.500000, 10.500000,
   units = IN,
was processed in the AutoCAD drawing file: C:\TMP\IENTITY3.dwg

*** Warning (ACAD_NEW_VIEW_VOLUME_GENERATED) ***
(DE: 1 TF: 410:0)
A new view volume has been generated for the view with:
 XMIN (-1.386796), XMAX (18.386796),

YMIN (-1.386796), YMAX (12.386796),
ZMIN (-1.886796), ZMAX (1.886796).

IGES Entity Summary

Type	Form	Description	Count	Processed	Errors
106	11	Planar Piecewise Linear Curve	67	67	0
110	0	Line	85	85	0
212	0	General Note (Simple)	83	83	0
212	2	General Note (Font change)	1	1	0
212	3	General Note (Superscript)	1	1	0
212	4	General Note (Subscript)	1	1	0
212	5	General Note (Super/subscript)	1	1	0
212	7	General Note (Center justified)	1	1	0
212	100	General Note (Simple fraction)	6	6	0
212	102	General Note (Fnt chg/dbl fract.)	1	1	0
404	0	Drawing (form 0)	1	1	0
406	16	Property (Drawing Size)	1	1	0
410	0	View	1	1	0
Totals			250	250	0

AutoCAD Entity Summary

Entity	Created	Errors
LINE	85	0
TEXT	132	0
INSERT	12	0
POLYLINE	67	0
BLOCK	12	0
Totals	308	0

Error Summary:

The following message was issued 1 time(s)
IGES file has greater number of significant digits in single precision numbers than this system.

The following message was issued 1 time(s)
A new view volume has been generated for the view with:
XMIN (%lf), XMAX (%lf),
YMIN (%lf), YMAX (%lf),
ZMIN (%lf), ZMAX (%lf).

Status: 0
Warning: 2
Error: 0
Fatal: 0

Elapsed Time:

Processor: 00:00:17
Clock: 00:00:17

9.1.3 IGES/Works Parser Log

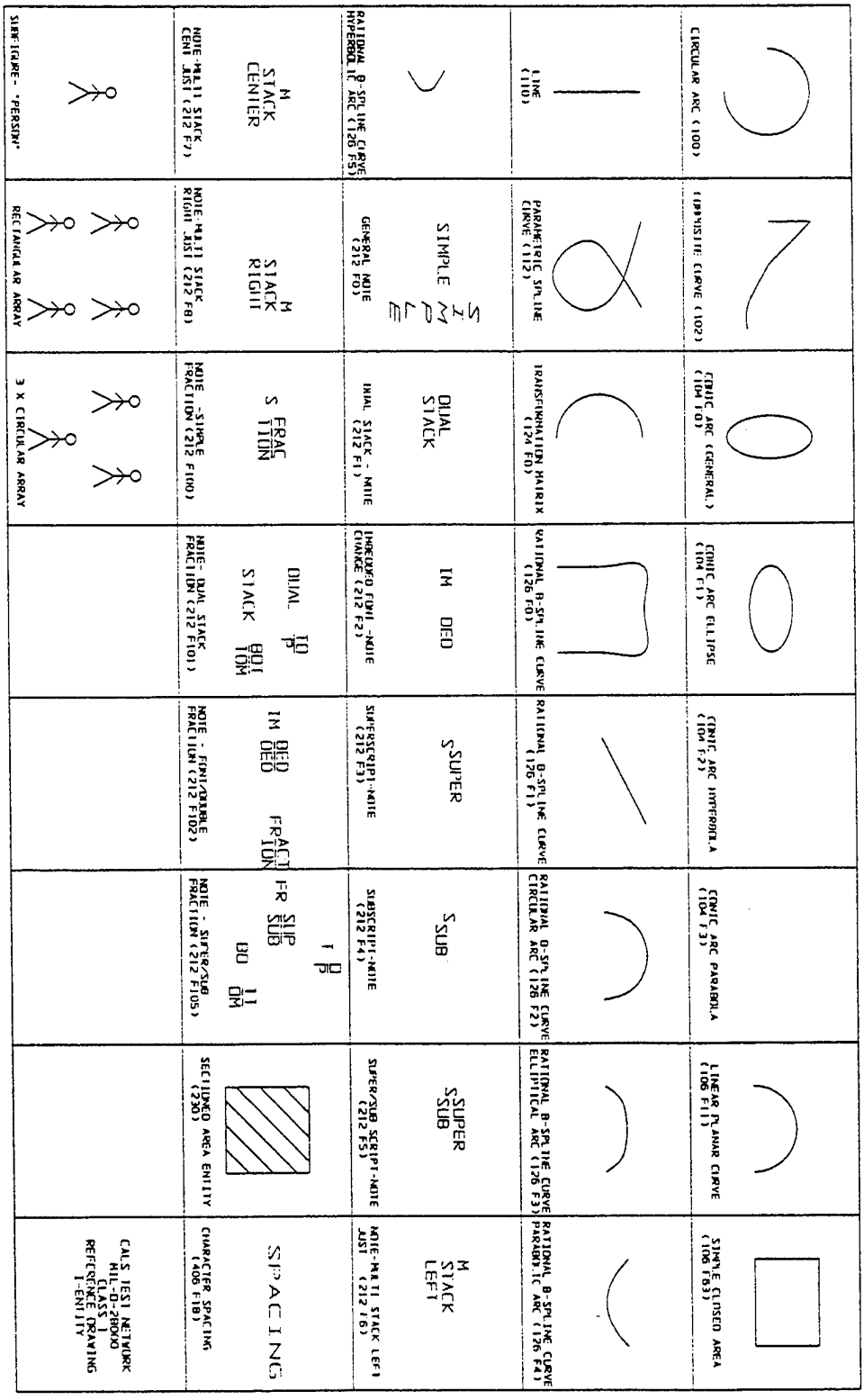
```
                    IGES/Works v1.4.1
              International TechneGroup Incorporated
                    Validation Logfile

   Date:   December 03, 1993
   Model:  ientity3_mvd

   ******************** Validation Parameters ********************

                TOLERANCE CONFIGURATION VALUES
                ------------------------------

   ZERO_TOL                    = 1.000000e-13
   MODEL_SPACE_PNT_COIN_TOL    = 1.000000e-03
   PARM_SPACE_PNT_COIN_TOL     = 1.000000e-08
   ISO_PARM_CURVE_TOL          = 1.000000e-08
   NON_CONV_TOL                = 1.000000e-12
   KNOT_COIN_TOL               = 1.000000e-10
   SAME_INTER_TOL              = 1.000000e-12
   PARALLEL_LINES_TOL          = 1.000000e-07
   ANGLE_COIN_TOL              = 1.000000e-05
   PNT_PROJ_TOL                = 1.000000e-07
   COLIN_TOL                   = 1.000000e-07
   COPLANAR_TOL                = 1.000000e-08
   ZERO_NORMAL_TOL             = 1.000000e-06
   SAME_TANGENT_TOL            = 1.000000e-04
   SAME_CURVATURE_TOL          = 1.000000e-04
   SAME_DERIVATIVE_TOL         = 1.000000e-03
   MODEL_LINEAR_APPROX_TOL     = 2.220446e-16

   ************** Entity Listing Before Validation ***************

     Count        Type         Form         Description
     -----        ----         ----         -----------
       67          106          11         Planar Piecewise Linear Curve
       85          110           0         Line
       95          212           0         General Note (Simple)

     247  -  Number of entities in selection list

   ********************* Entity Validation ***********************

Entity Validation Summary:

                                          Number of            Number of
```

Type	Form	Entity Count	Number Valid	Corrected Warnings	Corrected Errors	Uncorrected Warnings	Uncorrected Errors
Global	Section	1	1	0	0	0	0
106	11	67	67	0	0	0	0
110	0	85	85	0	0	0	0
212	0	95	95	0	0	0	0
Totals:		248	248	0	0	0	0

****

9.1.4 Output AutoCAD R12

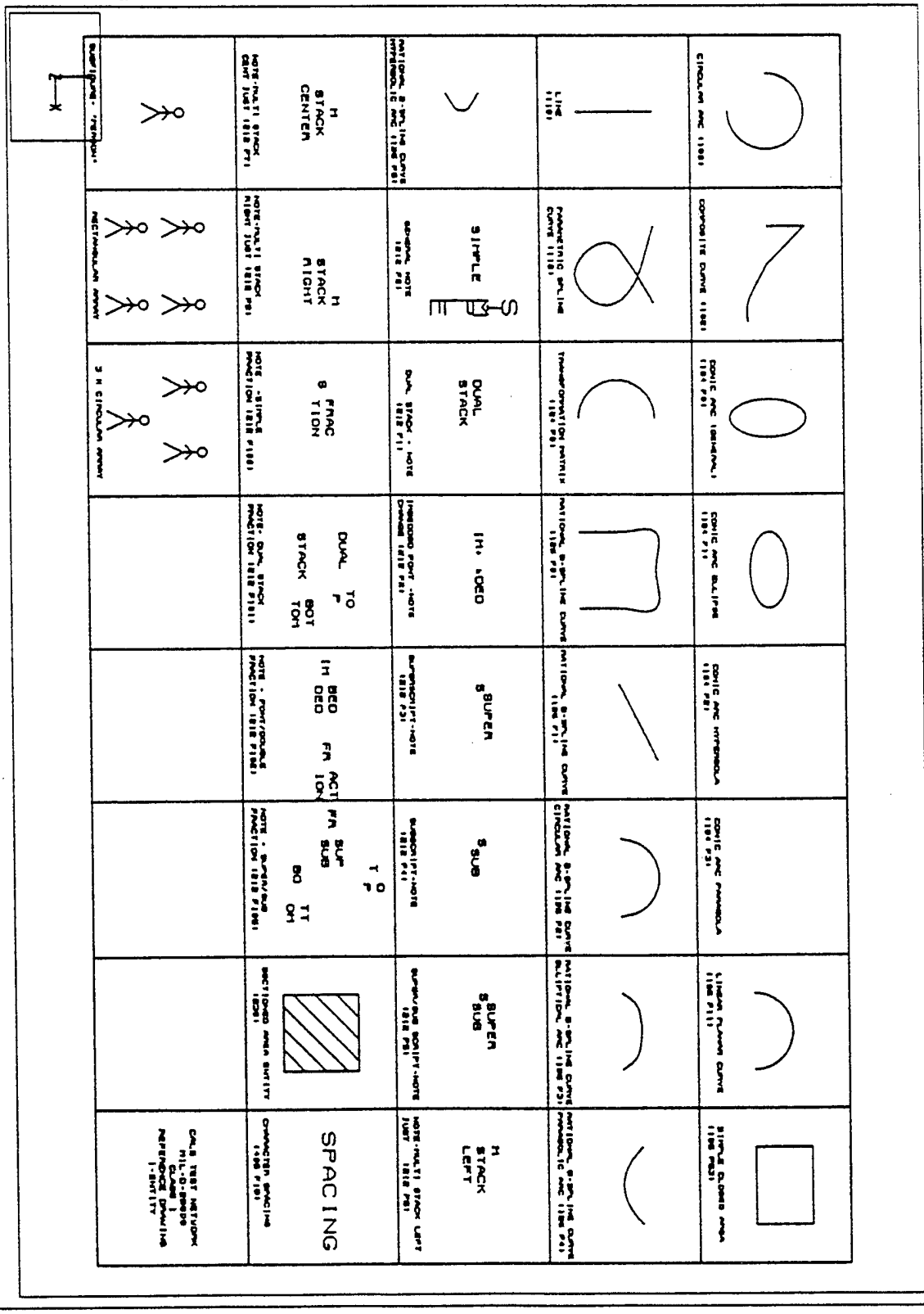
9.1.5 Output Cadkey v6.0



9.1.6 Output Cadkey v6.0 - Detail

NOTE)	IMBEDDED FONT -NOTE CHANGE (212 F2)	SUPERSCRIPT-NOTE (212 F3)	SUBSCRIPT-NOTE (212 F4)	SUPER
IM DED		S^{SUPER}	S_{SUB}	
100)	NOTE- DUAL STACK FRACTION (212 F101)	NOTE - FONT/DOUBLE FRACTION (212 F102)	NOTE - SUPER/SUB FRACTION (212 F105)	SECTI (
DUAL TO/P STACK BOT/TOM		IM BED/DED FR ACTION	FR SUP/SUB BO TT/OM T O/P	

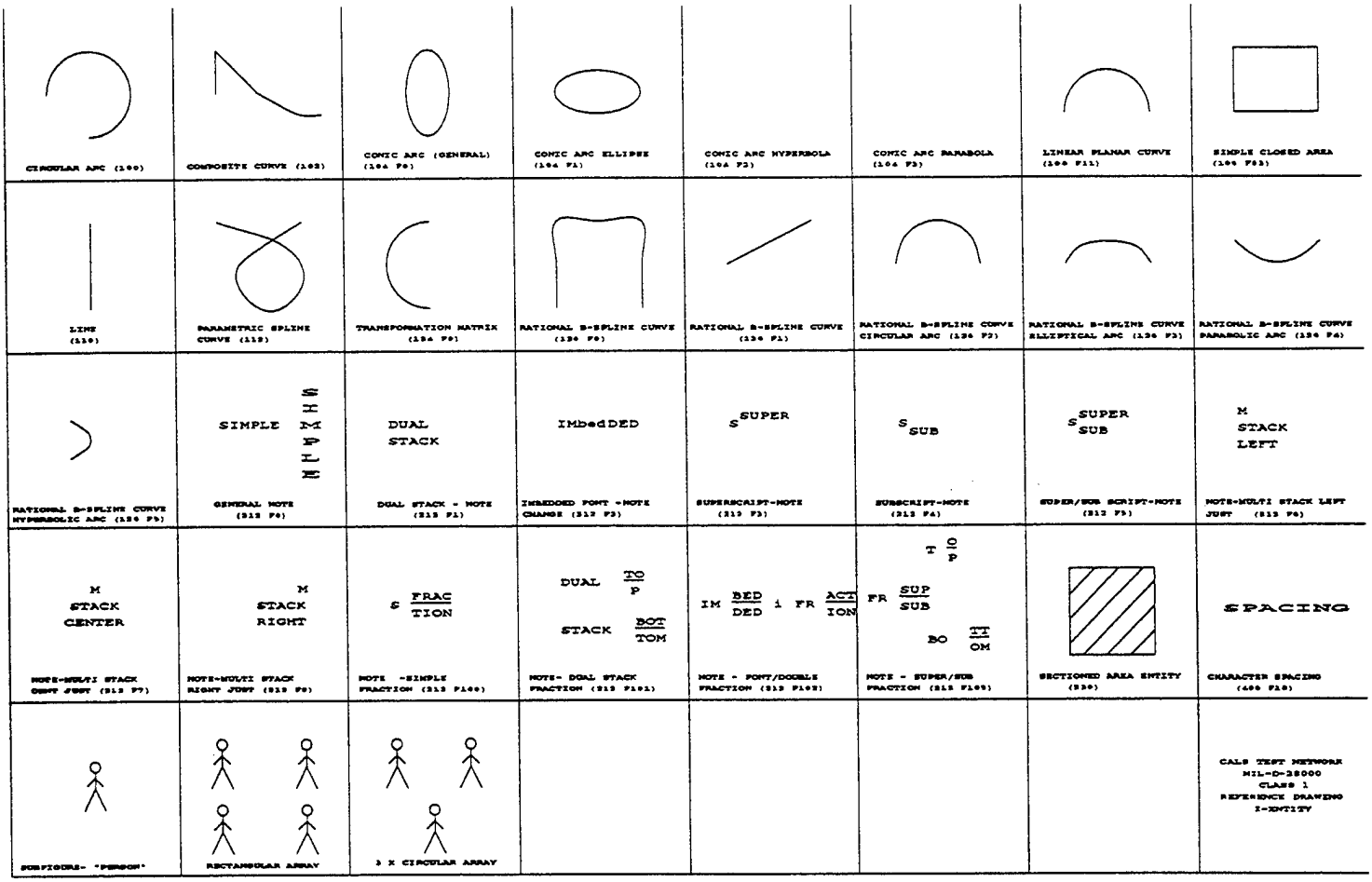
9.1.7 Output Generic



9.1.8 Output Generic - Detail

IM+ ≥DED IMBEDDED FONT -NOTE CHANGE (212 F2)	DUAL TO P STACK BOT TOM NOTE- DUAL STACK FRACTION (212 F101)	S SUPER SUPERSCRIPT-NOTE (212 F3)	S SUB SUBSCRIPT-NOTE (212 F4)
	IM BED DED FR ACTION NOTE - FONT/DOUBLE FRACTION (212 F102)		T O P BO TT OM FR SUP SUB NOTE - SUPER/SUB FRACTION (212 F105)

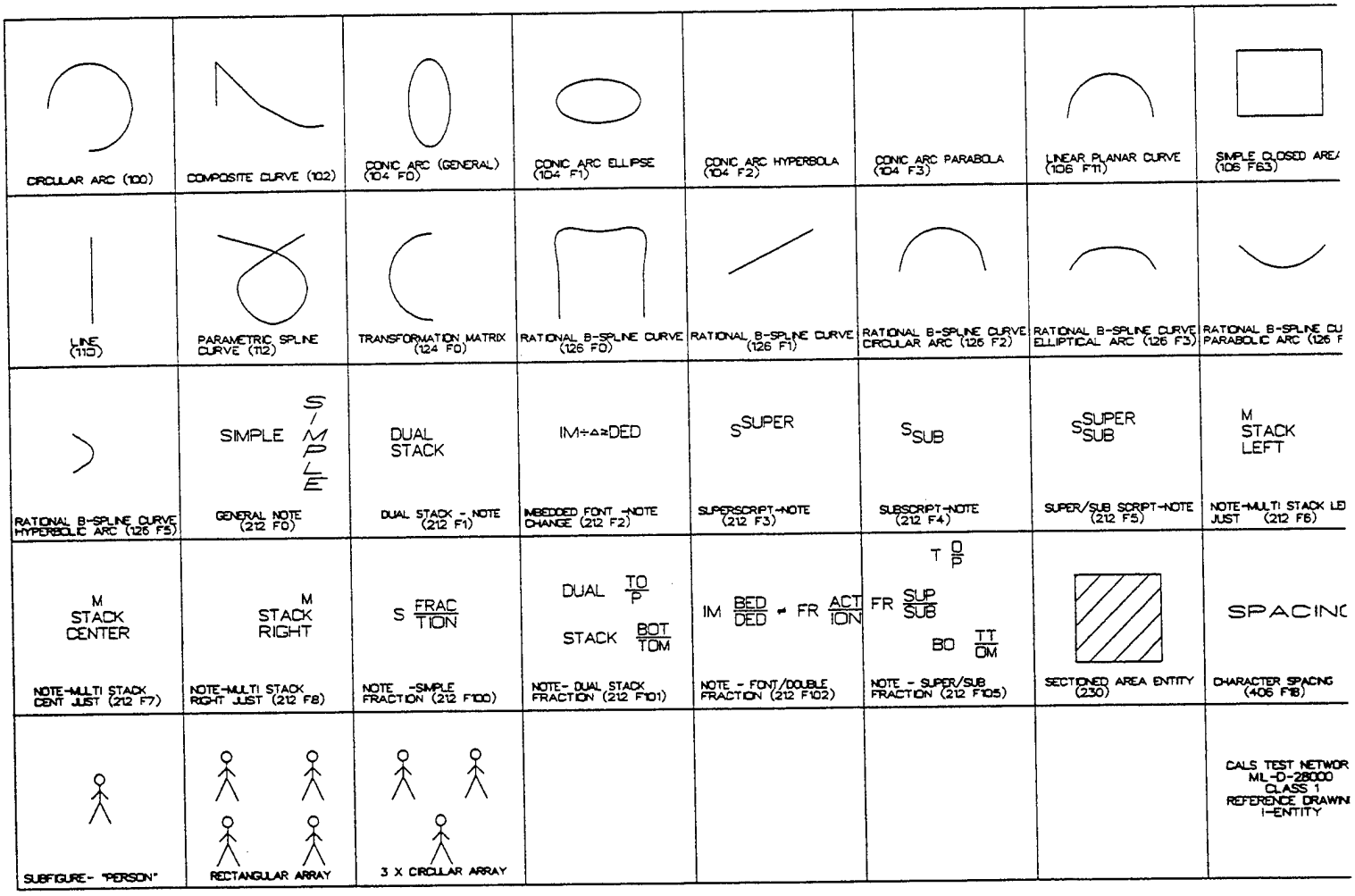
9.1.9 Output Cadleaf



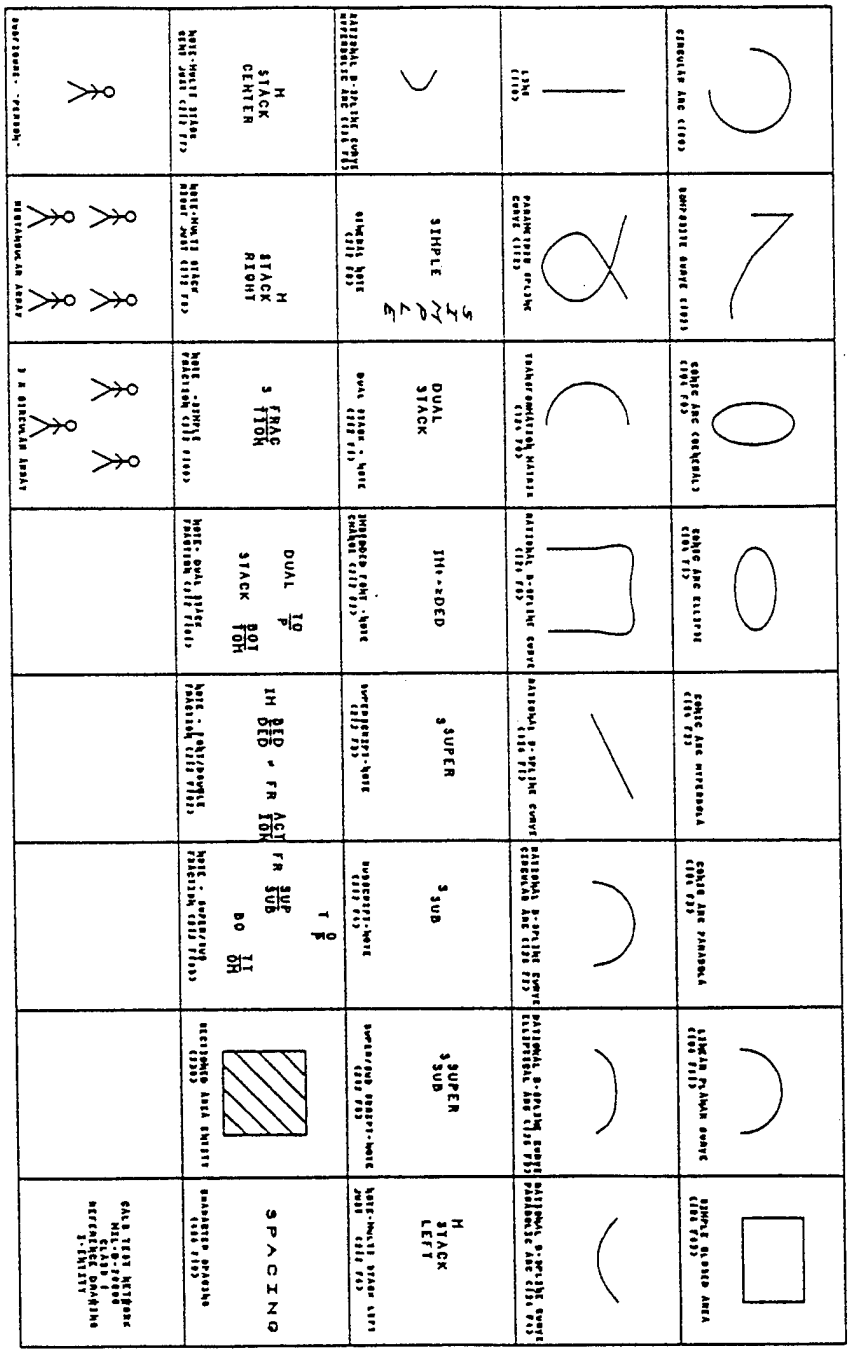
9.1.10 Output Cadleaf - Detail

IMbedDED	S SUPER	S SUB	
IMBEDDED FONT -NOTE CHANGE (212 F2)	SUPERSCRIPT-NOTE (212 F3)	SUBSCRIPT-NOTE (212 F4)	S
DUAL TO/P STACK BOT/TOM	IM BED/DED i FR ACT/ION	T O/P FR SUP/SUB BO TT/OM	
NOTE- DUAL STACK FRACTION (212 F101)	NOTE - FONT/DOUBLE FRACTION (212 F102)	NOTE - SUPER/SUB FRACTION (212 F105)	SI

9.1.11 Output IGESView



9.1.12 Output IGESWorks



9.1.13 Output IslandDraw

9.1.14 Output Generic

9.1.15 Output Generic - Detail